CLAIMS

1. A digital receiver fast frequency and time acquisition system using a single synchronization word comprising:

a first channel select (CS) filter filtering an incoming digital signal;

a frame synchronization detector for recognizing a time synchronization word from the first filtered signal;

a coarse symbol time estimator for coarsely adjusting the time synchronization of the digital signal from the frame synchronization detector;

a fine frequency estimator for finely adjusting the frequency of the signal from the coarse symbol time estimator for providing a frequency adjusted signal;

a mixer for combining the incoming digital signal with the frequency adjusted signal and providing a time and frequency compensated digital signal;

a second CS filter for filtering the frequency compensated digital signal;

a fine symbol time estimator for determining symbol timing with greater precision; and

a symbol detector for interpreting the incoming digital signal.

2. A digital receiver fast frequency and time acquisition system as in claim 1, wherein the first CS filter has a wider bandwidth than the second CS filter.

3. A digital receiver fast frequency and time acquisition system as in claim 1, wherein the second IF

filter has exactly half (or any other simple fractions such as one third, or one fourth etc) the bandwidth of the first CS filter.

4. A digital receiver fast frequency and time acquisition system as in claim 1, wherein the first CS filter has a 3 decibel (dB) bandwidth of approximately 6 Kilohertz (KHz).

5. A digital receiver fast frequency and time acquisition system as in claim 4, wherein the second CS filter has a 3 decibel (dB) bandwidth of approximately 3 Kilohertz (KHz).

6. A fast frequency and time acquisition system for synchronizing digital information for use with a digital radio frequency (RF) receiver comprising:

a first channel select (CS) filter for filtering digital baseband information;

a frame synchronization detector for detecting a synchronization word in the digital baseband information from the first CS filter;

a coarse symbol time estimator for coarsely determining the symbol time of the digital signal from the frame synchronization detector;

a fine frequency estimator for finely determining the frequency error of the signal from the coarse symbol time estimator for providing frequency adjustment;

a mixer for combining the unfiltered digital information with the frequency error estimate to provide a mixed frequency corrected digital signal;

a second CS filter for filtering the mixed digital signal;

a fine symbol time estimator for finely determining the symbol time of the signal from the second CS filter; and

a symbol detector for decoding the digital signal from the fine symbol time estimator.

7. A fast frequency and time acquisition system as in claim 6, wherein the coarse symbol estimator is compromised of:

a coarse symbol time estimator for coarsely estimating the symbol time of the digital signal; and

a fine frequency estimator for finely estimating the frequency of the digital signal from the coarse symbol time estimator.

8. A digital receiver fast frequency and time acquisition system as in claim 6, wherein the first CS filter has a wider bandwidth than then second CS filter.

9. A digital receiver fast frequency and time acquisition system as in claim 6, wherein the second CS filter has exactly half (or any other simple fractions such as one third, or one fourth etc) the bandwidth of the first CS filter.

10. A digital receiver fast frequency and time acquisition system as in claim 6, wherein the first CS filter has a 3 decibel (dB) bandwidth of approximately 6 Kilohertz (KHz).

11. A digital receiver fast frequency and time acquisition system as in claim 10, wherein the second CS filter has a 3 decibel (dB) bandwidth of approximately 3 Kilohertz (KHz).

12. A method for rapidly acquiring time and frequency synchronization for a digital RF baseband signal comprising the steps of:

directing a digital baseband signal to a first channel select (CS) filter;

detecting a time synchronization word in the digital signal from the first CS filter;

determining a coarse symbol time estimate of the signal of the signal from the first CS filter;

determining a fine frequency estimate of the digital signal from the coarse symbol time estimator;

applying a coarse time and frequency correction to digital signal to provide a time and frequency compensated signal;

mixing the frequency correction signal with the unfiltered digital baseband signal to provide a mixed signal;

applying the mixed signal to a second CS filter;

determining a fine symbol time estimate of the signal from the second CS filter;

applying a fine time correction to the signal from the second IF filter; and

detecting the symbols in the digital bit/symbol stream.

13. A digital receiver fast frequency and time acquisition system as in claim 12, wherein the first CS filter has a wider bandwidth than then second CS filter.

14. A digital receiver fast frequency and time acquisition system as in claim 12, wherein the second CS filter has exactly half the bandwidth of the first CS filter.

15. A digital receiver fast frequency and time acquisition system as in claim 12, wherein the first CS filter has a 3 decibel (dB) bandwidth of approximately 6 Kilohertz (KHz).

16. A digital receiver fast frequency and time acquisition system as in claim 15, wherein the second CS filter has a 3 decibel (dB) bandwidth of approximately 3 Kilohertz (KHz).